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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/849,221	05/20/2004	Kazuaki Inukai	403085	6822

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EXAMINER

EVERHART, CARIDAD

ART UNIT	PAPER NUMBER
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2891

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/849,221

Applicant(s)

INUKAI ET AL.

Examiner

Caridad M. Everhart

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### Response to Arguments

Applicant's argument that the first rejection omitted the claim numbers has been considered. Any inconvenience caused by this omission is regretted. The rejection in view of the Wang reference is withdrawn. Applicant has further argued that Robinson and Robb do not teach leaving the photoresist in place while the stopper film is removed. This argument is respectfully found to be not persuasive because the rejection is made in view of the combination of references, and Robinson and Robb are each relied upon for the cited portions of their respective disclosures. The IBM reference is relied upon for its teaching concerning the concentration of the hydrogen which is useful in etching photoresist, so that applicant's argument that the IBM reference does not add relevant teaching is respectfully found to be not persuasive.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-3, 7-10, and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee, et al (US 6,815,331B2) in view of Robinson et al (US 4,201,579) and further in view of Robb (US 4,529,860).

Lee et al disclose forming an etch stop 704, forming a dielectric 706, and an etch stop 708 and a photoresist 710(Fig. 37) and forming an opening in the photoresist(Fig. 37). The opening formed in the dielectric(Fig. 38) is to be filled with copper(col. 1, line s43-46). The etch stop may be silicon nitride or silicon carbide(col. 9, lines 3-7). The dielectric may be porous silicon oxide(col. 10, lines 55-60) or HSQ(col. 12, lines 63-66).

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After the etching of the dielectric layer, the photoresist is ashed(col. 16, lines 20-35).

The ashing gas is hydrogen and nitrogen(col. 11, lines 65-67 and col. 12, lines 1-5) in a dry etch. Lee teaches copper metallization(col. 1, lines 40-50).

Lee does not teach hydrogen and inert gas, although Lee does disclose that argon or inert gas may be used in ashing(col. 16, lines 65-68 and col. 17, lines 1-5).

Robinson et al discloses the etching of polymer layers using hydrogen and inert gas such as Ar (col. 1, lines 55-60 and col. 3, lines 28-33).

Robb discloses that nitrogen ashing produces compounds that may react with the photoresist or underlying layers, while the argon will not(col. 6, lines 40-67).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the hydrogen and helium in the process taught by Lee because Lee suggests the use of hydrogen and other inert gas than nitrogen and Robb teaches hydrogen and argon for polymer layers, and refers to Robinson with respect to the hydrogen ashing(col. 5, lines 51-55).

Claims 4-6, 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al in view of Robinson further in view of Robb as applied to claim 1 above, and further in view of IBM Tech. Discl. Bulletin(Feb. 1967, Vol. 9, Issue 9, page 1228).

Lee et al in view of Robinson further in view of Robb is silent with respect to the recited percentages of the hydrogen with respect to the inert gas.

IBM Tech. Discl. Bull discloses that hydrogen with argon can be used to remove photoresist with the hydrogen in 5 to 15 % .

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It would have been obvious to one of ordinary skill in the art to have used the percentages of the gases taught by IBM Tech. Discl. Bull in the method taught by Wang et al in view of Savas et al in order to completely remove the photoresist as taught by IBM Tech Discl Bull.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
CARIDAD EVERHART  
PRIMARY EXAMINER

C. Everhart  
5-14-2006